2010

Curricular Report No. 6A-2009-10 from the Graduate Council to the Faculty Senate: Proposal for a Five-Year Combined BS Physics/MS Medical Physics Degree Program.

University of Rhode Island Faculty Senate

THE
UNIVERSITY
OF RHODE ISLAND

THINK BIG WE DO

Serial Number #09-10--24

TO: President David Dooley

FROM: Stephen K. Swallow, Chairperson of the Faculty Senate

1. The attached BILL titled, Curricular Report No 6A-2009-10 from the Graduate Council to the Faculty Senate: Proposal for a Five-Year Combined BS Physics/MS Medical Physics Degree Program, is forwarded for your consideration.

2. This BILL was adopted by vote of the Faculty Senate on April 29, 2010,

3. After considering this bill, will you please indicate your approval or disapproval? Return the original or forward it to the Board of Governors, completing the appropriate endorsement below.

4. In accordance with Section 10, paragraph 4 of the Senate's By-Laws, this bill will become effective May 20, 2010 three weeks after Senate approval, unless: (1) specific dates for implementation are written into the bill; (2) you return it disapproved; (3) you forward it to the Board of Governors for their approval; or (4) the University Faculty petitions for a referendum. If the bill is forwarded to the Board of Governors, it will not become effective until approved by the Board.

May 5, 2010
(date)

Stephen K. Swallow
Chairperson of the Faculty Senate

ENDORSEMENT

TO: Chairperson of the Faculty Senate

FROM: President of the University

Returned.

a. Approved __.

b. Approved subject to final approval by Board of Governors ✓. Approved 12/6/10

c. Disapproved __.

5/13/10
(date)

President

Form revised 1/10

THE GRADUATE SCHOOL - UNIVERSITY OF RHODE ISLAND
NEW PROGRAM REPORT FROM THE GRADUATE COUNCIL TO THE FACULTY SENATE
CURRICULAR REPORT NO. 6A, 2009-2010; 15 March 2010

At Meeting No. 444 held on 15 March 2010, the Graduate Council approved the following proposal that is now submitted to the Faculty Senate.

SECTION I
BACKGROUND INFORMATION

ABSTRACT

The Graduate Council approved a proposal from the College of Arts and Sciences for a ***Five-Year Combined BS Physics/MS Medical Physics Degree Program.*** The Medical Physics program will provide students with rigorous training in essential undergraduate and graduate physics courses as well as medical-physics courses. Students will be introduced to both research and clinical aspects of modern medical physics through the Rhode Island Hospital state-of-the-art medical imaging and therapy facilities.

BACKGROUND

From the proposal: The field of medicine is facing a significant shortage of well-trained and qualified clinical medical physicists. With each passing year, this shortage expands because of the increasing use of complex technology in the field of radiation oncology and medical imaging. There is a growing demand for the training of professionals in medical physics. Only specially-created Medical Physics programs can accomplish this mission, since education in Medical Physics requires multidisciplinary effort. The program will be created based on the BS and MS programs in physics with introduction of the additional courses in photomedicine, nanotechnology, radiation physics and dosimetry, radiation oncology, radio-biology and a clinical practicum, which would be taught by URI Physics Department, the Rhode Island Hospital-Brown University Medical School faculty and the staff at the RI Nuclear Science Center at the Bay Campus.

The Budget Office reviewed the proposal with the understanding that the new program will use existing departmental faculty and support staff. The proposal also cites that additional resources are required for per course lecturers in year three (3) in order to offer the Five-Year Combined BS Physics/MS Medical Physics Degree Program. In year three, the cost of these RIH per course instructors will then be shifted to the University (total $12,600). Comments and recommendations are on file in the Graduate School.

SECTION II
RECOMMENDATION

The Graduate Council approved the proposal ***for a Five-Year Combined BS Physics/MS Medical Physics Degree Program*** at its Meeting No. 444 held on 15 March 2010, and forwards it to the Faculty Senate with a recommendation for approval.

A Proposal for a Five-Year Combined BS Physics/MS Medical Physics Degree Program

PROGRAM INFORMATION

A1. Name of institution

University of Rhode Island

A2. Name of department, division, school or college

Physics
Arts and Sciences

A3. Title of proposed program and Classification of Instructional Programs (CIP) code

5-Year Combined BS in Physics/MS in Medical Physics
CIP: 51.2205

A4. Intended initiation date of program change. include anticipated date for granting first degrees or certificates, if appropriate.

Program start date: September 2010
First degrees granted: May 2013

A5. Intended location of the program

University of Rhode Island and Rhode Island Hospital

A6. Description of institutional review and approval process

Approval Date

Department – September 2009
College – September 2009
CAC/Graduate Council - March 2010
Faculty Senate-
President of the University-

A7. Summary description of proposed program (not to exceed 2 pages)

The Department of Physics in the School of Arts and Sciences, URI in conjunction with the Medical Physics Division of the Radiation Oncology Department of the Cancer Center at Rhode Island Hospital is proposing new 5-years program in Medical Physics. The successful completion of this program will earn a student a Bachelor of Science in Physics and a Master of Science in Medical Physics.

The field of medicine is facing a significant shortage of well-trained and qualified clinical medical physicists. With each passing year, this shortage expands because of the increasing use of complex technology in the field of radiation oncology and medical imaging. There is a growing demand for the training of professionals in medical physics. Only specially-created Medical Physics programs can accomplish this mission, since education in Medical Physics requires multidisciplinary effort. The American Association of Physicists in Medicine is spearheading an effort to address this shortfall and is planning on establishing an accreditation agency for such programs. According to the American Board of Radiation (ABR): "beginning in 2012, in order to take the American Board of Radiology Part 1 examination in Radiologic Physics, candidates must be enrolled in or have graduated from a Commission on the Accreditation of Medical Physicists Educational Programs (CAMPEP) accredited education program (e.g., MS, PhD, or residency). Beginning in 2014, in order to take the American Board of Radiology Part 1 examination in Radiologic Physics, candidates must be enrolled in or have completed a CAMPEP accredited residency program".

We believe that it will be necessary to start and fill the program prior to that time in order to be competitive. The window of opportunity is open for us. The 5-year program will be the first in the Northeast.

Our Medical Physics program will provide students with rigorous training in essential undergraduate and graduate physics courses as well as medical-physics courses. Students will be introduced to both research and clinical aspects of modern medical physics through the Rhode Island Hospital state-of-the-art medical imaging and therapy facilities. The program will be created based on the BS and MS programs in physics with introduction of the additional courses in photomedicine, nanotechnology, radiation physics and dosimetry, radiation oncology, radio-biology and a clinical practicum, which would be taught by URI Physics Department, the Rhode Island Hospital-Brown University Medical School faculty and the staff at the RI Nuclear Science Center at the Bay Campus. Adjunct status would be given to staff not currently URI faculty. (RIH and RINSC have offered to donate their time for the first two years of courses.)

Several years ago Physics Department at URI established scientific relations with the Medical Physics Division at Rhode Island Hospital. We have also incorporated visits to Rhode Island Hospital, Medical Physics Division in

some of our courses. These interactions have attracted students' attention and generated substantial interest among them to pursue careers in medical physics. Several of our graduates have already continued their careers in medical physics. In fact a Ph. D. student, who has specialized in biophysics and has worked as an intern at RIH, will begin his residency program in medical physics at RIH this summer; a residency program established specifically for graduates of degree programs such as the one we are proposing.

We believe that University of Rhode Island has a unique opportunity to take the lead in the creation of one of the first Medical Physics programs in New England by combining the knowledge and expertise in physics, biological physics and medical physics available at the URI, Rhode Island Hospital and the Rhode Island Nuclear Science Center.

Program requirements: Meet all degree requirements for BS in Physics, plus complete the additional courses:

i) courses offered in URI: CHM101 (4), BIO121 (4), BIO242 (3), BIO244(1), STA307 (3), SOC224 (3), ELE562 (3), ELE564 (3)

ii) courses proposed to developed by the Physics Department and Rhode Island Hospital (RIH)

PHY210 (1) - Radiation Safety – presently given on demand by RSO, PHY545 (3) – Nanotechnology in imaging and therapy and PHY565 (3) – Photomedicine will be developed/given at the Physics Department, URI

PHY550 (3) – Introduction to Radiation Physics and Dosimetry; PHY552 (3) – Radiobiology; PHY555 (4) – Radiation Oncology Clinical Practicum – will be developed/ given at RIH

A8. Signature of the President

_____

A9. Person to contact during the proposal review

Name: Jan Northby
Title: Professor and Chair
Phone: 874-2042
Email: JNorthby@mail.uri.edu

A10. Signed agreements for any cooperative arrangements made with other institutions/agencies or private companies in support of the program.

A letter of agreement with RIH, similar to the one signed for the Pharmacy Program is pending.

RATIONALE: There should be a demonstrable need for the program

B1. State the program objectives.

Use the existing BS degree program requirements in Physics as basis to develop an accelerated five-year Masters Program in Medical Physics with the objectives:
a) Take a leadership role in New England by having the first program of its type.

b) Prepare well-trained professionals for challenging and rewarding careers.

c) Improve the delivery of medical services in Rhode Island and beyond.

d) Use the collaboration with RIH to cultivate further research and teaching opportunities.

B2. Explain and quantify the needs addressed by this program, and present evidence that the program fulfills these needs.

The field of medicine is facing significant shortage of well-trained and qualified medical physicists. With each passing year, this shortage expands because of the increasing use of complex technology in the field of radiation oncology and medical imaging. There is a growing demand in training of professionals in medical physics. Medical physics is a highly specialized field, so much so that it is one of only two non-physician specialties accorded board certification by the American Board of Medical Specialties. Medical physics is not a discipline that can be learned "on-the-job", only specially-created Medical Physics programs can accomplish the mission, since education in Medical Physics requires multidisciplinary effort. New positions and retirements suggest a demand for about 300 positions/year, exceeding current supply channels, which requires the opening of special programs with degrees in Medical Physics. The MS degree in Medical Physics is a very desirable degree because undergraduates in physics have seen it as an additional two-year commitment followed by virtually guaranteed employment as a junior medical physicist, with annual salaries approaching six digits.

B3. If an external advisory or steering committee was used to develop the program, identify committee members and their affiliations and describe the committee's role.

The program was developed by faculty in the Physics Department, URI and Rhode Island Hospital, Medical Physics Division.

INSTITUTIONAL ROLE: The program should be clearly related to the published role and mission of the institution and be compatible with other programs and activities of the institution.

C1. Explain how the program is consistent with the published role and mission of the institution and how it is related to the institution's academic planning.

The program is consistent with University, College and Department mission statements. It represents extension of the department's undergraduate BS degree programs to meet the need for education in Medical Physics. The Medical Physics Program would address the mission of the University by augmenting the current Physics curriculum in *a common quest for knowledge* and *outreach* [that] *serve Rhode Island and beyond.* The objectives of the Medical Physics Program include a) *Creativity and Scholarship* via the advancement of knowledge in the areas of medicine and biological physics, b) *Engaged Learning and Civic Involvement* where active learning is applied for the common good, and c) The preparation of students for *Intellectual and Ethical Leadership* in order for them to become independent and productive leaders in the fields of public health and medicine.

The Medical Physics Program would respond to the University's academic plans, by a) adding an innovative inter-disciplinary program integrating health systems with science and technology, b) creating partnerships which span Rhode Island, c) positioning the University to be a leader in the Northeast in a health related field, d) fostering interactions among academic units at the University, and e) expanding access to accelerated Master Degree programs.

C2. Explain the relationship of the program to other programs offered by the institution.

The program is an extension of the existing BS degree program in the department and uses courses from the Physics MS curriculum.

INTERINSTITUTIONAL CONSIDERATIONS: The program should be consistent with all policies of the Board of Governors pertaining to the coordination and collaboration between public institutions of higher education. (Consult the Board of Governors' *Coordination Plan for Academic Programs in Rhode Island Public Institutions of Higher Education* [www.ribghe.org/publicreg.htm] for guidelines and restrictions regarding the types and levels of programs the institutions are allowed to offer.)

D1. List similar programs offered in the state and region, and compare the objectives of similar programs.

There are no similar programs offered either at URI or any other institution in the state, or in New England.

D2. Estimate the projected impact of program on other public higher education institutions in Rhode Island (e.g. loss of students or revenues), provide a rationale for the assumptions made in the projections, and indicate the manner in which the other public institutions were consulted in developing the projections.

No impact on other institutions of higher education.

D3. Using the format prescribed by RIOHE, describe provisions for transfer students (into or out of the program) at other Rhode Island public institutions of higher education. Describe any transfer agreements with independent institutions. The institution must also either submit a Joint Admissions Agreement transition plan or the reason(s) the new program is not transferable. (See *Procedure for Strengthening the Articulation/Transfer Component of the Review Process for New Programs* which can be found at *www.ribghe.org/publicreg.htm.*)

No additional provisions beyond current College of Arts and Sciences practice.

D4. Describe any cooperative arrangements with institutions offering similar programs. (Signed copies of any agreements pertaining to use of faculty, library, equipment, and facilities should be attached.)

None

D5. If external affiliations are required, identify providing agencies (Indicate the status of any arrangements made and append letters of agreement, if appropriate.)

A letter of agreement with RIH, similar to the one signed for the Pharmacy Program is pending.

D6. Indicate whether the program will be available to students under the New England Board of Higher Education's (NEBHE) Regional Student Program (RSP).

Yes

E. PROGRAM: The program should meet a recognized educational need and be delivered in an appropriate mode.

E1. Prepare a typical curriculum display for one program cycle for each sub-major, specialty or option, including the following information:

a. Name of courses, departments, and catalog numbers and brief descriptions for new courses, preferably as these will appear in the catalog. In keeping with each institution's timetable for completion of student outcomes assessment, each institution should provide an assessment plan detailing what a student should know and be able to do at of the program and how the skills and knowledge will be assessed. For example, if a department brings forth a new program proposal but that department is not slated to have its student outcomes assessment completed until 2008, the program could be approved but with the provision that the department return no later than 2008 and present to the Academic and Student Affairs Committee its student outcomes for that particular program.

PHY210 (1) - Radiation Safety (presently given on demand by RSO)
Description: Introduction in radiological physics and dosimetry, basic physical quantities and units used in radiation physics, radiation safety.

PHY545 (3) – Nanotechnology in imaging and therapy (will be developed/given at the Physics Department, URI)
Description: Vizulaization and manipulation at nano-scale, nanomaterials: main properties and characteristics, nanomaterials application in drug delivery and diagnostics, nanodevices, nano-oncology.

PHY565 (3) – Photomedicine (will be developed/given at the Physics Department, URI)
Description: Interaction of light with matter, use light in diagnostic and treatment of diseases, physical principles of optical imaging with biomedical applications, photodynamic therapy

PHY550 (3) – Introduction to Radiation Physics and Dosimetry (will be developed/ given at RIH)
Description: The course covers the basic principles of radiation physics applied to radiation oncology. Topics to be covered include: radioactivity, the physics of ionizing radiation, radiation dosimetry, radiation therapy equipment, and radiation detectors. The course will also provide the student with an understanding of the role of the medical physicist as an integral part of multi-disciplinary clinical care in radiation oncology. Prerequisite: PHY210: Radiation Safety

PHY552 (3) – Radiobiology

Description: The course will covers the basic principles of radiation physics applied to radiation oncology. Topics to be covered include: radioactivity, the physics of ionizing radiation, radiation dosimetry, radiation therapy equipment, and radiation detectors. The course will also provide the student with an understanding of the role of the medical physicist as an integral part of multi-disciplinary clinical care in radiation oncology.

PHY555 (4) – Radiation Oncology Clinical Practicum – will be developed/ given at RIH

Description: This course will provide hands on experience in the practical aspects of medical physics as applied to radiation oncology. Special emphasis will be given to the operation of various therapy equipment and dose measuring devices, techniques of measuring the characteristics of radiation beams, commissioning and quality assurance checks for radiation producing devices in the clinic. Prerequisite: PHY550: Introduction to Radiation Physics and Dosimetry

b. Required courses in area of specialization and options, if any

Curriculum of the 5-years URI-RIH program in Medical Physics, which offers BS in Physical Sciences and MS in Medical Physics

Red – all required courses for BS in Physics, total 74 credits
Blue – one MTH 300/400 level course is replaced by STA307
* - new courses

c. Course distribution requirements, if any, within program, and general education requirements

No additional requirements

	Courses					S /GE	Total
F-1	MTH141 (4) (RGE3)	BIO121 (3) +BIO121(1)	PHY203 (3) +PHY273 (1)	URI101 (1)	Gen Ed (3)	13 / 6	16
S-1	MTH142 (4)	BIO242 (3) +BIO244 (1)	CHM101 (4) +lab (RGE3)	PHY204 (3) +PHY274 (1)	Gen Ed (3)	16 / 6	19
F-2	MTH243 (3)	CSC211 (4)	PHY205 (3) +PHY275 (1)	PHY210* (1)	Gen Ed (6)	12 / 6	18
S-2	MTH244 (3)	PHY306 (3)	PHY410 (3)		Gen Ed (9)	9 / 9	18
F-3	MTH215 (3)	PHY381 (3)	PHY451 (3)	PHY322 (3) or PHY420	Gen Ed (6)	12 / 6	18
S-3	PHY331 (3)	PHY382 (3)	PHY540 (3) or PHY545	PHY455 (3)	Gen Ed (6)	12 / 6	18
F-4	PHY550* (3) or PHY552	PHY560 (3) or PHY565	PHY510 (3) or PHY610	PHY420 (3) or PHY322	ELE564 (4) +lab	16	16
S-4	PHY452 (3) or PHY570	STA307 (3)	PHY545* (3) or PHY540	PHY402 (1)	ELE562 (4) +lab	14	14
F-5	PHY552* (3) or PHY550	PHY565* (3) or PHY560	PHY610 (3) or PH510	PHY483 (3)		12	12
S-5	PHY555* (4)	PHY691 (3)	SOC224 (3)	PHY484 (3)	Final exam	13	13

d. Total number of free electives available after specialization and general education requirements are satisfied

None

e. Total number of credits required for completion of program or for graduation. Present evidence that the program is of appropriate length as illustrated by conformity with appropriate accrediting agency standards, applicable industry standards, or other credible measure, and comparability of lengths with similar programs in the state or region.

Total Credits: 162
BS science Credits: 77
GenEd credits: 39
These courses can be classified as follows:
Physics BS requirements (77 credits):
PHY 203, 273, 204, 274, 205, 275, 306, 322, 331, 381, 382, 402, 410, 420, 451, 452(or 570), 455, 483, 484, 510 – ***52 Credits***
MTH 141, 142, 215, 243, 244 – ***17 Credits***
STA 307 – ***3 Credits*** (Replaces required MTH elective in BS.)
CSC 211 - ***4 Credits***
URI101 – ***1 Credit***

General Education – *33 Credits* (These credits are in addition to those for Gen Eds CHM101(3) and MTH141(3).)

Additional Required Courses – *16 Credits* (These replace the 8 free-elective credits and 3 Gen Ed credits in the standard BS physics program) – PHY210, BIO121, BIO242, BIO244, CHM101, SOC224

TOTAL UNDERGRADUATE = *126 Credits*

Medical Physics MS
PHY 540, 545, 550, 552, 555, 560, 565, 610, 691 – ***28 Credits***
ELE 562, 564 – ***8 Credits***
TOTAL GRADUATE = *36 Credits*

PROGRAM TOTAL – *162 Credits*

f. Identify any courses that will be delivered or received by way of distance learning. (Refer to *www.ribghe.org/publicreg.htm* for the *Standards for Distance Learning in the Rhode Island System of Public Higher Education.*)

None

E2. Describe certification/licensing requirements, if any, for program graduates and the degree to which completion of the required course work meets said requirements. Indicate the agencies and timetables for graduates to meet those requirements.

Masters Degree Program in Medical Physics is a base qualification, which allows and prepares students to take American Board of Radiology (ABR) exams consisting of 3 parts:

Part I: everybody with a Master's Degree and the required course work will qualify.

Part II: This exam requires at least two years of experiential training beyond obtaining the Masters Degree. After 2012 you have to have completed a 2 year CAMPEP (Commission for the Accreditation of Medical Physics Educational Programs) approved residency program to qualify for the Part II exam.

Part III: This is an oral exam that is taken the year following Part II. Part III exams are offered in June each year, while the written Part I and II is offered in Aug/Sept each year.

After passing Part III you receive the ABR certification.

E3. Include the learning goals (what students are expected to gain, achieve, know, or demonstrate by completion of the program) and requirements for each program.

Student are expected to be get knowledge in general physics and special knowledge in medical physics with hands experience in RI hospital and be prepared to continue a career in physics or medical physics and take ABR exam. The learning goals are the following:

1. Introductory physics and math courses - understanding of basic classical physics and ability to use calculus for problem solving.

2. Junior-level physics and math courses - sophisticated understanding of thermodynamics, mechanics, and electromagnetism with ability to solve relevant differential equations analytically and numerically.

3. Senior-level courses physics and math courses- able to apply advanced mathematical techniques to concepts in quantum mechanics. Ready to begin a supervised research program.

4. Graduate-level physics - mastery of advanced physics as demonstrated by course work, comprehensive, and research.

5. Radiation and biological courses – understanding of living system organization and interaction with radiation, physical principles and operation of various imaging and radiation therapy equipment and dose measuring devices

Students attainment of the goals will be determined in part by a comprehensive examination given in their final semester and by a capstone research project.

E4. Demonstrate that student learning is assessed based on clear statements of learning outcomes and expectations.

a. Include the learning goals (what students are expected to gain, achieve, know, or demonstrate by completion of the program) requirements for each program

The detailed list and explanation of the learning goals will be distributed and discussed with each student in their initial meeting with the Advisory Committee (see E4b). As students progress through their courses and projects the committee will note the satisfactory completion the goals.

b. Demonstrate that student learning is assessed based on clear statements of learning outcomes and expectations.

The URI physics faculty (Advisory Committee) on the Steering Committee (see L4) will serve to advise and monitor the students. They will also modify the learning goals as appropriate. The learning outcomes will be partially assessed through a comprehensive exam given in the final semester. The exam will parallel the physics MS comprehensive exam. It will consist of several sections including quantum mechanics, statistical mechanics and thermodynamics, electromagnetism, biology, and radiation physics, in which the problems are created by a committee specific for each section. As with the MS comprehensive, the topics for which the students are responsible are detailed and publicized. The full physics faculty will grade the coded (anonymous) exams. The committee will not only use this exam as a tool to evaluate the students but also as an assessment metric for the quality and effectiveness of the courses, books, staffing, and student research. It will also serve to give feedback to the Steering Committee about the type of students the department should be admitting.

In addition, the research project, in the final year, will be used to ensure that the students have mastered the practical aspects of the curriculum.

F. **FACULTY AND STAFF: The faculty and support staff for the program should be sufficient in number and demonstrate the knowledge, skills, and other attributes necessary to the success of the program**

F1. Describe the faculty who will be assigned to the program. Indicate total full-time equivalent (FTE) positions required for the program, the proportion of program faculty who will be in tenure-track positions, and whether faculty positions will be new positions or reassignment of existing positions.

Will use existing department faculty, and Faculty at Brown Medical School, Rhode Island Hospital will participate as a per-course instructors (see supporting letter attached). No additional faculty required.

F2. List anticipated support staff, the percent of their time to be spent in the program, and whether these are reassignments or new positions. Indicate total full-time equivalent (FTE) positions required for the program.

Will use existing support staff.

F3. Summarize the annual costs for faculty and support staff by indicating salaries and fringe benefits (adjusted for the proportion of time devoted to the program). Distinguish between existing resources and new resources. Specify in the narrative if resources are to be provided by more than one department. (Include the salary and benefits information on the budget form that can be found at *www.ribghe.org/publicreg.htm*.)

No impact on faculty or staff support costs.
3 per-course instructors/year = $12,600

F4. Provide assurance that the institution's chief academic officer has worked with the director of human resources (or equivalent) in the development of the faculty and staff projections and estimates and that they agree on the adequacy of the estimates.

G. STUDENTS: The program should be designed to provide students with a course of study that will contribute to their intellectual, social and economic well-being. Students selected should have the necessary potential and commitment to complete the program successfully.

G1. Describe the potential students for the program and the primary source of students. Indicate the extent to which the program will attract new

students or will draw students from existing programs and provide a specific rationale for these assumptions. For graduate programs, indicate which undergraduate programs would be a potential source of students.

2 to 4 students/year from existing BS program in physics or engineering selected based on application. Also, will likely draw new students (2 to 4)/year to Medical Physics degree program.

G2. Estimate the proposed program size and provide projected annual full-time, part-time, and FTE enrollments for one complete cycle of the program. Provide a specific rationale for the assumptions made in the projections. (Depending on the nature of the program, use the FTE or part-time estimates of enrollment on the budget form, which can be found at *www.ribghe.org/publicreg.htm*.)

4 to 8 students per class, five class years, hence 32 to 40 FTE students when fully
operational.

G3. Indicate how the institution provides programs and services designed to assist students in achieving their academic goals.

The physics department supports undergraduates through graduate teaching assistants' office hours. A help room is staffed 30 hours /week. The Academic Enrichment Center is also available for students needing further assistance. But, the most important asset is a dedicated faculty.

G4. List the program admission and retention requirements for students. Provide descriptions of the specific criteria and methods used to assess students' ability to benefit from the program. Describe how satisfactory academic progress will be determined.

The admission requirements for entering high school students will be the same as for students in the STEM disciplines. Formal admission to the MS program will take place at the end of the third year. The requirements: Junior standing in Medical Physics (see page 8), with a quality point average of 3.0, or higher, overall and 3.2 in required courses.

Students, who wish to change their program to Medical Physics, will be considered when they have completed the program's Junior-level requirements, as described in the chart on page 8.

In rare cases, superior students (QPA>3.7) with a BS in physics from another institution and a strong background in biology, may be considered for

admission to the MS program. Admitted students will have to satisfy all of the requirements of the full program, which would require at least 2 years because of course rotation.

There are no retention requirements; students can move to traditional BS and MS programs if the pace of accelerated program is too fast for them or for any other reason. Students in this program will have an Advisory Committee (see L4) which will closely monitor their progress and assist with any issues that may arise. Satisfactory progress will be shown by students maintaining a 3.0 QPA and advancing through their course of studies.

G5. Indicate available funds for assistantships, scholarships and fellowships. (Include this information on the budget form, which can be found at *www.ribghe.org/publicreg.htm.*)

Physics department scholarship: Physics Department, URI received $10,000 donation from private funds. Money will be used for scholarship.

The American Association of Physicists in Medicine (AAPM) Summer Undergraduate Fellowship Program is designed to provide opportunities for undergraduate university students to gain experience in medical physics by performing research in a medical physics laboratory or assisting with clinical service at a clinical facility.

The American Association of Physicists in Medicine (AAPM) Minority Undergraduate Summer Experience Program (MUSE) is designed to expose minority undergraduate university students to the field of medical physics by performing research or assisting with clinical service at a U.S. institutions (university, clinical facility, laboratory, etc).

H. ADMINISTRATION: Administrative oversight for the program should be sufficient to ensure quality.

H1. Indicate how the program will be administered and the degree to which this work will affect the administrative structure in which it is located.

Current administrative procedures will be used.

H2. Indicate the titles of the persons who will have administrative responsibility for the program and the percent of time each will spend on the program.

Department Chair: Jan Northby

H3. Indicate additional annual administrative salaries and related costs to be associated with the program. Distinguish between existing resources and new resources. (Include this information on the budget form, which can be found at *www.ribghe.org/publicreg.htm.*)

None

I. INSTRUCITONAL RESOURCES: The instructional resources should be sufficient in quantity, quality and timeliness to support a successful program.

I1. Estimate the number and cost of relevant print electronic and other non-print library materials needed (and those available) for the program and compare with recommendations of national accrediting agencies, the standards of the Association of College and Research Libraries, and/or any other recognized measures of general library adequacy in terms of collections, staff, space and operations.

None beyond existing resources

I2. Identify and evaluate other instructional resources and instructional support equipment (such as computers, laboratory equipment and supplies) in terms of overall capability to satisfy the needs of the program. If these instructional resources are considered insufficient or if upgrading is necessary for the development of the program, the additional needs should be detailed and their cost estimated.

RIH will be making available state-of-the–art medical facilities for students in this program. We are also applying for grants to augment our equipment and update some of our labs. While these upgrades are beneficial, they are not required for the success of the program.

I3. Estimate annual expenditures for instructional resources. Distinguish between existing resources and new resources. The information should reflect the annual operation and maintenance of the instructional resources, recurrent costs and costs for necessary additions. (Include this information on the budget form, which can be found at *www.ribghe.org/publicreg.htm.*)

None beyond existing resources or 3 per-course instructors/year = $12,600

I4. Provide assurance that the institution's chief academic officer has worked with appropriate library and other staff in the development of the assessments and estimates regarding instructional resources and they are in agreement on the adequacy of estimates.

J. FACILITIES AND CAPITAL EQUIPMENT: Facilities and capital equipment should be sufficient in quantity, quality and timeliness to support a successful program.

J1. Describe the facilities and capital equipment (e.g., classrooms, office space, laboratories, and telecommunications equipment) and assess the adequacy of these resources relative to the program and to the requirements of the American with Disabilities Act and state disability statues.

Uses existing resources.

J2. If new or renovated facilities are necessary, explain in detail (e.g., requirements, costs, sources of revenue, and expected date of completion). (Include this information on the budget form, which can be found at *www.ribghe.org/publicreg.htm.*) [Note: the RIBGHE's Facilities Committee is responsible for approving lease, purchase or other agreements and ensuring that the facility meets all building, fire and health codes and ADA requirements.]

None

J3. Estimate the annual additional expenditures for new program facilities and capital equipment. (Include this information on the budget form, which can be found at *www.ribghe.org/publicreg.htm.*)

None

J4. Indicate whether the needed facilities are included in the institution's master plan.

Not applicable

J5. Provide assurance that the institution's chief academic officer has worked with the facilities director (or equivalent) in the development of

assessments and estimates regarding facilities and capital equipment and that they agree on the adequacy of estimates.

Not applicable

K. FINANCIAL CONSIDERATIONS: Projected revenues should be sufficient to support a successful program and must cover the estimated costs of the program.

K1. Expenditures for program initiation and annual operation should be estimated and displayed in the proposed budget. The summary should enable the reader to understand expenditures for a period representative of one full program cycle.

Estimate for 2 In-State and 2 Out-of State Students/year

Income When 5-year Program is Saturated:

- **10($7,454)+10($23,552) = $310,060/year**
- **Initial Grant from RIH = $25,200 (waiver of per-course salary for 2 years)**

Expenses:

- **3 per-course instructors/year = $12,600**

K2. Revenue estimates should be provided for a similar period of time. For a new program, the appropriateness and feasibility of instituting differential tuition and/or fees should be addressed.

NOTE: Excel budge forms, which are self-calculating, may be downloaded from the RIOHE website at *www.ribghe.org/publicreg.htm.* Contact RIOHE's Academic and Student Affairs division for assistance in completing the forms.

$297,460/year (310,060-12,600)

K3. Describe how current institutional resources will be redeployed or extra institutional resources will be obtained to support the program (e.g., describe program eliminations, staff reallocations and/or external sources of monies).

No redeployment of resources.

K4. Provide assurance that the institution's chief academic officer has worked with budget director and controller in the development of the financial projections and that they agree on the adequacy of the estimates.

L. EVALUATION: Appropriate criteria for evaluating the success of a program should be development and used.

L1. List the performance measures by which the institution plans to evaluate the program. Indicate the frequency of measurement and the personnel responsible for performance measurements. Describe provisions made for external evaluation, as appropriate.

Department faculty together with faculty from RI Hospital (the Steering Committee) will review the program annually. An in depth review will be held after the first class graduates. Annual and three year adjustments to the program will be made as appropriate.

L2. Describe and quantify the program's criteria for success.

The criteria for success are three-fold:

a) **Compete successfully against programs from across the nation for the brightest students. The incoming high school records and SAT scores of our students will be a measure of our success. Currently, the SAT scores of incoming declared Physics Majors are second only to those of the 6-year Pharmacy Program. Our initial target is 5 incoming students /year.**

b) **Graduate and place students who become leaders in Medical Physics. Success will be measured by the percentage of incoming students who complete the program on time. Our target is 60%.**

c) **Expand the profile of the University through interaction throughout Rhode Island. The success of our effort will be measured by increased donations to our department and college. We already have a committed $10,000 donation for students in Medical Physics.**

L3. If the proposed program is eligible for specialized accreditation, indicate name and address of the accrediting agency and a list of accreditation requirements. If specialized accreditation is available but not sought, indicate reasons.

Our goal is to start program and obtain accreditation. The Commission on the Accreditation of Medical Physicists Educational Programs (CAMPEP) is a

nonprofit organization whose objectives are the review and accreditation of educational programs in medical physics. Now, accreditation is a voluntary, non-governmental process of peer review, the objective of which is to ensure a program or institution has met a defined standard. Accreditation serves as public recognition that a program provides a quality service or education.

L4. Describe the process that communicates the results of the program evaluation to appropriate institutional stakeholders and uses the outcomes for program improvement.

A committee of Physics Faculty and RIH Medical Physicists will serve as a Steering Committee to monitor the program with respect to the criteria above. Adjustments will be made to optimize the program. The results will be forwarded to the Dean of the College of Arts and Sciences.

Bill # 09-10--24

Donald Kahn
Jan Northby
Calvin Read

Diana Beauvais
John Kuby
Winnie Brownell
Sheila Hubman
Jack Humphrey
Sheila Hubman

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RIBGHE

December 7, 2010

TO: President Dooley

FROM: Commissioner Di Pasquale

SUBJECT: Proposal from URI to Offer a Five-Year Combined Bachelor of Science in Physics/Master of Science in Medical Physics

This correspondence will confirm the action taken by the Rhode Island Board of Governors for Higher Education on the above-referenced item at their meeting on December 6, 2010.

VOTED: THAT the Board of Governors for Higher Education approves the proposal from the University of Rhode Island to offer a five-year combined Bachelor of Science in Physics/Master of Science in Medical Physics.

c. Donald DeHayes
Deborah Grossman-Garber
Winnie Brownell

THE
UNIVERSITY
OF RHODE ISLAND
Full Proposal Form RIBGHE

A Proposal for a Five-Year Combined BS Physics/MS Medical Physics Degree Program
September 25, 2009

A. PROGRAM INFORMATION

A1. Name of institution

University of Rhode Island

A2. Name of department, division, school or college

Physics
Arts and Sciences

A3. Title of proposed program and Classification of Instructional Programs (CIP) code

5-Year Combined BS in Physics/MS in Medical Physics
CIP: 51.2205

A4. Intended initiation date of program change. Include anticipated date for granting first degrees or certificates, if appropriate.

Program start date: September 2010
First degrees granted: May 2013

A5. Intended location of the program

University of Rhode Island and Rhode Island Hospital

A6. Description of institutional review and approval process

	Approval Date
Department/College	September 2009
CAC/Graduate Council	March 15, 2010
Faculty Senate	May 5, 2010
President of the University	

A7. Summary description of proposed program (not to exceed 2 pages)

The Department of Physics in the School of Arts and Sciences, URI in conjunction with the Medical Physics Division of the Radiation Oncology Department of the Cancer Center at Rhode Island Hospital is proposing new 5-years program in Medical Physics. The successful completion of this program will earn a student a Bachelor of Science in Physics and a Master of Science in Medical Physics.

The field of medicine is facing a significant shortage of well-trained and qualified clinical medical physicists. With each passing year, this shortage expands because of the increasing use of complex technology in the field of radiation oncology and medical imaging. There is a growing demand for the training of professionals in medical physics. Only specially-created Medical Physics programs can accomplish this mission, since education in Medical Physics requires multidisciplinary effort. The American Association of Physicists in Medicine is spearheading an effort to address this shortfall

and is planning on establishing an accreditation agency for such programs. According to the American Board of Radiation (ABR): "beginning in 2012, in order to take the American Board of Radiology Part 1 examination in Radiologic Physics, candidates must be enrolled in or have graduated from a Commission on the Accreditation of Medical Physicists Educational Programs (CAMPEP) accredited education program (e.g., MS, PhD, or residency). Beginning in 2014, in order to take the American Board of Radiology Part 1 examination in Radiologic Physics, candidates must be enrolled in or have completed a CAMPEP accredited residency program".

We believe that it will be necessary to start and fill the program prior to that time in order to be competitive. The window of opportunity is open for us. The 5-year program will be the first in the Northeast.

Our Medical Physics program will provide students with rigorous training in essential undergraduate and graduate physics courses as well as medical-physics courses. Students will be introduced to both research and clinical aspects of modern medical physics through the Rhode Island Hospital state-of-the-art medical imaging and therapy facilities. The program will be created based on the BS and MS programs in physics with introduction of the additional courses in photomedicine, nanotechnology, radiation physics and dosimetry, radiation oncology, radio-biology and a clinical practicum, which would be taught by URI Physics Department, the Rhode Island Hospital-Brown University Medical School faculty and the staff at the RI Nuclear Science Center at the Bay Campus. Adjunct status would be given to staff not currently URI faculty. (RIH and RINSC have offered to donate their time for the first two years of courses.)

Several years ago Physics Department at URI established scientific relations with the Medical Physics Division at Rhode Island Hospital. We have also incorporated visits to Rhode Island Hospital, Medical Physics Division in some of our courses. These interactions have attracted students' attention and generated substantial interest among them to pursue careers in medical physics. Several of our graduates have already continued their careers in medical physics. In fact a Ph. D. student, who has specialized in biophysics and has worked as an intern at RIH, will begin his residency program in medical physics at RIH this summer; a residency program established specifically for graduates of degree programs such as the one we are proposing.

We believe that University of Rhode Island has a unique opportunity to take the lead in the creation of one of the first Medical Physics programs in New England by combining the knowledge and expertise in physics, biological physics and medical physics available at the URI, Rhode Island Hospital and the Rhode Island Nuclear Science Center.

Program requirements: Meet all degree requirements for BS in Physics, plus complete the additional courses:

i) courses offered in URI: CHM101 (4), BIO121 (4), BIO242 (3), BIO244(1), STA307 (3), SOC224 (3), ELE562 (3), ELE564 (3)

ii) courses proposed to developed by the Physics Department and Rhode Island Hospital (RIH)

PHY210 (1) - Radiation Safety – presently given on demand by RSO,
PHY545 (3) – Nanotechnology in imaging and therapy and
PHY565 (3) – Photomedicine will be developed/given at the Physics Department, URI
PHY550 (3) – Introduction to Radiation Physics and Dosimetry;
PHY552 (3) – Radiobiology;
PHY555 (4) – Radiation Oncology Clinical Practicum – will be developed/ given at RIH

A8. Signature of the President

David M. Dooley

A9. Person to contact during the proposal review

Name: Don D. DeHayes
Title: Provost & Vice President for Academic Affairs
Phone: 874-4408
Email: dalynread@mail.uri.edu

Name: Jan Northby
Title: Professor and Chair
Phone: 874-2042
Email: JNorthby@mail.uri.edu

A10. Signed agreements for any cooperative arrangements made with other institutions/agencies or private companies in support of the program.

A letter of agreement with RIH, similar to the one signed for the Pharmacy Program is pending.

B. RATIONALE: There should be a demonstrable need for the program

B1. State the program objectives.

Use the existing BS degree program requirements in Physics as basis to develop an accelerated five-year Masters Program in Medical Physics with the objectives:
a) Take a leadership role in New England by having the first program of its type.
b) Prepare well-trained professionals for challenging and rewarding careers.
c) Improve the delivery of medical services in Rhode Island and beyond.
d) Use the collaboration with RIH to cultivate further research and teaching opportunities.

B2. Explain and quantify the needs addressed by this program, and present evidence that the program fulfills these needs.

The field of medicine is facing significant shortage of well-trained and qualified medical physicists. With each passing year, this shortage expands because of the increasing use of complex technology in the field of radiation oncology and medical imaging. There is a growing demand in training of professionals in medical physics. Medical physics is a highly specialized field, so much so that it is one of only two non-physician specialties accorded board certification by the American Board of Medical Specialties. Medical physics is not a discipline that can be learned "on-the-job", only specially-created Medical Physics programs can accomplish the mission, since education in Medical Physics requires multidisciplinary effort. New positions and retirements suggest a demand for about 300 positions/year, exceeding current supply channels, which requires the opening of special programs with degrees in Medical Physics. The MS degree in Medical Physics is a very desirable degree because undergraduates in physics

have seen it as an additional two-year commitment followed by virtually guaranteed employment as a junior medical physicist, with annual salaries approaching six digits.

B3. If an external advisory or steering committee was used to develop the program, identify committee members and their affiliations and describe the committee's role.

The program was developed by faculty in the Physics Department, URI and Rhode Island Hospital, Medical Physics Division.

C. **INSTITUTIONAL ROLE: The program should be clearly related to the published role and mission of the institution and be compatible with other programs and activities of the institution.**

C1. Explain how the program is consistent with the published role and mission of the institution and how it is related to the institution's academic planning.

The program is consistent with University, College and Department mission statements. It represents extension of the department's undergraduate BS degree programs to meet the need for education in Medical Physics. The Medical Physics Program would address the mission of the University by augmenting the current Physics curriculum in *a common quest for knowledge* and *outreach* [that] *serve Rhode Island and beyond*. The objectives of the Medical Physics Program include a) *Creativity and Scholarship* via the advancement of knowledge in the areas of medicine and biological physics, b) *Engaged Learning and Civic Involvement* where active learning is applied for the common good, and c) The preparation of students for *Intellectual and Ethical Leadership* in order for them to become independent and productive leaders in the fields of public health and medicine.

The Medical Physics Program would respond to the University's academic plans, by a) adding an innovative inter-disciplinary program integrating health systems with science and technology, b) creating partnerships which span Rhode Island, c) positioning the University to be a leader in the Northeast in a health related field, d) fostering interactions among academic units at the University, and e) expanding access to accelerated Master Degree programs.

C2. Explain the relationship of the program to other programs offered by the institution.

The program is an extension of the existing BS degree program in the department and uses courses from the Physics MS curriculum.

D. **INTERINSTITUTIONAL CONSIDERATIONS: The program should be consistent with all policies of the Board of Governors pertaining to the coordination and collaboration between public institutions of higher education. (Consult the Board of Governors' *Coordination Plan for Academic Programs in Rhode Island Public Institutions of Higher Education* [www.ribghe.org/publicreg.htm] for guidelines and restrictions regarding the types and levels of programs the institutions are allowed to offer.)**

D1. List similar programs offered in the state and region, and compare the objectives of similar programs.

There are no similar programs offered either at URI or any other institution in the state, or in New England.

D2. Estimate the projected impact of program on other public higher education institutions in Rhode Island (e.g. loss of students or revenues), provide a rationale for the assumptions made in the projections, and indicate the manner in which the other public institutions were consulted in developing the projections.

No impact on other institutions of higher education.

D3. Using the format prescribed by RIOHE, describe provisions for transfer students (into or out of the program) at other Rhode Island public institutions of higher education. Describe any transfer agreements with independent institutions. The institution must also either submit a Joint Admissions Agreement transition plan or the reason(s) the new program is not transferable. (See *Procedure for Strengthening the Articulation/Transfer Component of the Review Process for New Programs* which can be found at *www.ribghe.org/publicreg.htm.*)

No additional provisions beyond current College of Arts and Sciences practice.

D4. Describe any cooperative arrangements with institutions offering similar programs. (Signed copies of any agreements pertaining to use of faculty, library, equipment, and facilities should be attached.)

None

D5. If external affiliations are required, identify providing agencies (Indicate the status of any arrangements made and append letters of agreement, if appropriate.)

A letter of agreement with RIH, similar to the one signed for the Pharmacy Program is pending.

D6. Indicate whether the program will be available to students under the New England Board of Higher Education's (NEBHE) Regional Student Program (RSP).

Yes

E. PROGRAM: The program should meet a recognized educational need and be delivered in an appropriate mode.

E1. Prepare a typical curriculum display for one program cycle for each sub-major, specialty or option, including the following information:

a. Name of courses, departments, and catalog numbers and brief descriptions for new courses, preferably as these will appear in the catalog. In keeping with each institution's timetable for completion of student outcomes assessment, each institution should provide an assessment plan detailing what a student should know and be able to do at of the program and how the skills and knowledge will be assessed. For example, if a department brings forth a new program proposal but that department is not slated to have its student outcomes assessment completed until 2008, the program could be approved but with the provision that the department return no later than 2008 and present to the Academic and Student Affairs Committee its student outcomes for that particular program.

PHY210 (1) - Radiation Safety (presently given on demand by RSO)
Description: Introduction in radiological physics and dosimetry, basic physical quantities and units used in radiation physics, radiation safety.

PHY545 (3) – Nanotechnology in imaging and therapy (will be developed/given at the Physics Department, URI)

Description: Vizulaization and manipulation at nano-scale, nanomaterials: main properties and characteristics, nanomaterials application in drug delivery and diagnostics, nanodevices, nano-oncology.

PHY565 (3) – Photomedicine (will be developed/given at the Physics Department, URI)

Description: Interaction of light with matter, use light in diagnostic and treatment of diseases, physical principles of optical imaging with biomedical applications, photodynamic therapy

PHY550 (3) – Introduction to Radiation Physics and Dosimetry (will be developed/given at RIH)

Description: The course covers the basic principles of radiation physics applied to radiation oncology. Topics to be covered include: radioactivity, the physics of ionizing radiation, radiation dosimetry, radiation therapy equipment, and radiation detectors. The course will also provide the student with an understanding of the role of the medical physicist as an integral part of multi-disciplinary clinical care in radiation oncology. Prerequisite: PHY210: Radiation Safety

PHY552 (3) – Radiobiology

Description: The course will covers the basic principles of radiation physics applied to radiation oncology. Topics to be covered include: radioactivity, the physics of ionizing radiation, radiation dosimetry, radiation therapy equipment, and radiation detectors. The course will also provide the student with an understanding of the role of the medical physicist as an integral part of multi-disciplinary clinical care in radiation oncology.

PHY555 (4) – Radiation Oncology Clinical Practicum – will be developed/ given at RIH

Description: This course will provide hands on experience in the practical aspects of medical physics as applied to radiation oncology. Special emphasis will be given to the operation of various therapy equipment and dose measuring devices, techniques of measuring the characteristics of radiation beams, commissioning and quality assurance checks for radiation producing devices in the clinic. Prerequisite: PHY550: Introduction to Radiation Physics and Dosimetry

b. Required courses in area of specialization and options, if any

Curriculum of the 5-years URI-RIH program in Medical Physics, which offers BS in Physical Sciences and MS in Medical Physics

Red – all required courses for BS in Physics, total 74 credits
Blue – one MTH 300/400 level course is replaced by STA307
* - new courses

c. Course distribution requirements, if any, within program, and general education requirements

No additional requirements

d. Total number of free electives available after specialization and general education requirements are satisfied

None

e. Total number of credits required for completion of program or for graduation. Present evidence that the program is of appropriate length as illustrated by conformity with appropriate accrediting agency standards, applicable industry standards, or other credible measure, and comparability of lengths with similar programs in the state or region.

Total Credits: 162
BS science Credits: 77
GenEd credits: 39
These courses can be classified as follows:

	Courses					S /GE	Total
F-1	MTH141 (4) (RGE3)	BIO121 (3) +BIO121(1)	PHY203 (3) +PHY273 (1)	URI101 (1)	Gen Ed (3)	13 / 6	16
S-1	MTH142 (4)	BIO242 (3) +BIO244 (1)	CHM101 (4) +lab (RGE3)	PHY204 (3) +PHY274 (1)	Gen Ed (3)	16 / 6	19
F-2	MTH243 (3)	CSC211 (4)	PHY205 (3) +PHY275 (1)	PHY210* (1)	Gen Ed (6)	12 / 6	18
S-2	MTH244 (3)	PHY306 (3)	PHY410 (3)		Gen Ed (9)	9 / 9	18
F-3	MTH215 (3)	PHY381 (3)	PHY451 (3)	PHY322 (3) or PHY420	Gen Ed (6)	12 / 6	18
S-3	PHY331 (3)	PHY382 (3)	PHY540 (3) or PHY545	PHY455 (3)	Gen Ed (6)	12 / 6	18
F-4	PHY550* (3) or PHY552	PHY560 (3) or PHY565	PHY510 (3) or PHY610	PHY420 (3) or PHY322	ELE564 (4) +lab	16	16
S-4	PHY452 (3) or PHY570	STA307 (3)	PHY545* (3) or PHY540	PHY402 (1)	ELE562 (4) +lab	14	14
F-5	PHY552* (3) or PHY550	PHY565* (3) or PHY560	PHY610 (3) or PH510	PHY483 (3)		12	12
S-5	PHY555* (4)	PHY691 (3)	SOC224 (3)	PHY484 (3)	Final exam	13	13

Physics BS requirements (77 credits):
PHY 203, 273, 204, 274, 205, 275, 306, 322, 331, 381, 382, 402, 410, 420, 451, 452(or 570), 455, 483, 484, 510 – *52 Credits*
MTH 141, 142, 215, 243, 244 – *17 Credits*

STA 307 – *3 Credits* (Replaces required MTH elective in BS.)
CSC 211 - *4 Credits*
URI101 – *1 Credit*

General Education – *33 Credits* (These credits are in addition to those for Gen Eds CHM101(3) and MTH141(3).)

Additional Required Courses – *16 Credits* (These replace the 8 free-elective credits and 3 Gen Ed credits in the standard BS physics program) – PHY210, BIO121, BIO242, BIO244, CHM101, SOC224

TOTAL UNDERGRADUATE = *126 Credits*

Medical Physics MS
PHY 540, 545, 550, 552, 555, 560, 565, 610, 691 – ***28 Credits***
ELE 562, 564 – ***8 Credits***
TOTAL GRADUATE = *36 Credits*

PROGRAM TOTAL – *162 Credits*

f. Identify any courses that will be delivered or received by way of distance learning. (Refer to *www.ribghe.org/publicreg.htm* for the *Standards for Distance Learning in the Rhode Island System of Public Higher Education.*)

None

E2. Describe certification/licensing requirements, if any, for program graduates and the degree to which completion of the required course work meets said requirements. Indicate the agencies and timetables for graduates to meet those requirements.

Masters Degree Program in Medical Physics is a base qualification, which allows and prepares students to take American Board of Radiology (ABR) exams consisting of 3 parts:

Part I: everybody with a Master's Degree and the required course work will qualify.

Part II: This exam requires at least two years of experiential training beyond obtaining the Masters Degree. After 2012 you have to have completed a 2 year CAMPEP (Commission for the Accreditation of Medical Physics Educational Programs) approved residency program to qualify for the Part II exam.

Part III: This is an oral exam that is taken the year following Part II. Part III exams are offered in June each year, while the written Part I and II is offered in Aug/Sept each year.

After passing Part III you receive the ABR certification.

E3. Include the learning goals (what students are expected to gain, achieve, know, or demonstrate by completion of the program) and requirements for each program.

Student are expected to be get knowledge in general physics and special knowledge in medical physics with hands experience in RI hospital and be prepared to continue a career in physics or medical physics and take ABR exam. The learning goals are the following:

1. Introductory physics and math courses - understanding of basic classical physics and ability to use calculus for problem solving.

2. Junior-level physics and math courses - sophisticated understanding of thermodynamics, mechanics, and electromagnetism with ability to solve relevant differential equations analytically and numerically.

3. Senior-level courses physics and math courses- able to apply advanced mathematical techniques to concepts in quantum mechanics. Ready to begin a supervised research program.

4. Graduate-level physics - mastery of advanced physics as demonstrated by course work, comprehensive, and research.

5. Radiation and biological courses – understanding of living system organization and interaction with radiation, physical principles and operation of various imaging and radiation therapy equipment and dose measuring devices

Students attainment of the goals will be determined in part by a comprehensive examination given in their final semester and by a capstone research project.

E4. Demonstrate that student learning is assessed based on clear statements of learning outcomes and expectations.

a. Include the learning goals (what students are expected to gain, achieve, know, or demonstrate by completion of the program) requirements for each program

The detailed list and explanation of the learning goals will be distributed and discussed with each student in their initial meeting with the Advisory Committee (see E4b). As students progress through their courses and projects the committee will note the satisfactory completion the goals.

b. Demonstrate that student learning is assessed based on clear statements of learning outcomes and expectations.

The URI physics faculty (Advisory Committee) on the Steering Committee (see L4) will serve to advise and monitor the students. They will also modify the learning goals as appropriate. The learning outcomes will be partially assessed through a comprehensive exam given in the final semester. The exam will parallel the physics MS comprehensive exam. It will consist of several sections including quantum mechanics, statistical mechanics and thermodynamics, electromagnetism, biology, and radiation physics, in which the problems are created by a committee specific for each section. As with the MS comprehensive, the topics for which the students are responsible are detailed and publicized. The full physics faculty will grade the coded (anonymous) exams. The committee will not only use this exam as a tool to evaluate the students but also as an assessment metric for the quality and effectiveness of the courses, books, staffing, and student research. It will also serve to give feedback to the Steering Committee about the type of students the department should be admitting.

In addition, the research project, in the final year, will be used to ensure that the students have mastered the practical aspects of the curriculum.

F. **FACULTY AND STAFF: The faculty and support staff for the program should be sufficient in number and demonstrate the knowledge, skills, and other attributes necessary to the success of the program**

F1. Describe the faculty who will be assigned to the program. Indicate total full-time equivalent (FTE) positions required for the program, the proportion of program faculty who will be in tenure-track positions, and whether faculty positions will be new positions or reassignment of existing positions.

Will use existing department faculty, and Faculty at Brown Medical School, Rhode Island Hospital will participate as a per-course instructors (see supporting letter attached). No additional faculty required.

F2. List anticipated support staff, the percent of their time to be spent in the program, and whether these are reassignments or new positions. Indicate total full-time equivalent (FTE) positions required for the program.

Will use existing support staff.

F3. Summarize the annual costs for faculty and support staff by indicating salaries and fringe benefits (adjusted for the proportion of time devoted to the program). Distinguish between existing resources and new resources. Specify in the narrative if resources are to be provided by more than one department. (Include the salary and benefits information on the budget form that can be found at *www.ribghe.org/publicreg.htm*.)

No impact on faculty or staff support costs.
3 per-course instructors/year = $12,600

F4. Provide assurance that the institution's chief academic officer has worked with the director of human resources (or equivalent) in the development of the faculty and staff projections and estimates and that they agree on the adequacy of the estimates.

G. **STUDENTS: The program should be designed to provide students with a course of study that will contribute to their intellectual, social and economic well-being. Students selected should have the necessary potential and commitment to complete the program successfully.**

G1. Describe the potential students for the program and the primary source of students. Indicate the extent to which the program will attract new students or will draw students from existing programs and provide a specific rationale for these assumptions. For graduate programs, indicate which undergraduate programs would be a potential source of students.

2 to 4 students/year from existing BS program in physics or engineering selected based on application. Also, will likely draw new students (2 to 4)/year to Medical Physics degree program.

G2. Estimate the proposed program size and provide projected annual full-time, part-time, and FTE enrollments for one complete cycle of the program. Provide a specific rationale for the assumptions made in the projections. (Depending on the nature of the program, use the FTE or part-time estimates of enrollment on the budget form, which can be found at *www.ribghe.org/publicreg.htm*.)

4 to 8 students per class, five class years, hence 32 to 40 FTE students when fully operational.

G3. Indicate how the institution provides programs and services designed to assist students in achieving their academic goals.
The physics department supports undergraduates through graduate teaching assistants' office hours. A help room is staffed 30 hours / week. The Academic Enrichment Center is also available for students needing further assistance. But, the most important asset is a dedicated faculty.

G4. List the program admission and retention requirements for students. Provide descriptions of the specific criteria and methods used to assess students' ability to benefit from the program. Describe how satisfactory academic progress will be determined.

The admission requirements for entering high school students will be the same as for students in the STEM disciplines. Formal admission to the MS program will take place at the end of the third year. The requirements: Junior standing in Medical Physics (see page 8), with a quality point average of 3.0, or higher, overall and 3.2 in required courses.

Students, who wish to change their program to Medical Physics, will be considered when they have completed the program's Junior-level requirements, as described in the chart on page 8.

In rare cases, superior students (QPA>3.7) with a BS in physics from another institution and a strong background in biology, may be considered for admission to the MS program. Admitted students will have to satisfy all of the requirements of the full program, which would require at least 2 years because of course rotation.

There are no retention requirements; students can move to traditional BS and MS programs if the pace of accelerated program is too fast for them or for any other reason. Students in this program will have an Advisory Committee (see L4) which will closely monitor their progress and assist with any issues that may arise. Satisfactory progress will be shown by students maintaining a 3.0 QPA and advancing through their course of studies.

G5. Indicate available funds for assistantships, scholarships and fellowships. (Include this information on the budget form, which can be found at *www.ribghe.org/publicreg.htm.*)

Physics department scholarship: Physics Department, URI received $10,000 donation from private funds. Money will be used for scholarship.

The American Association of Physicists in Medicine (AAPM) Summer Undergraduate Fellowship Program is designed to provide opportunities for undergraduate university students to gain experience in medical physics by performing research in a medical physics laboratory or assisting with clinical service at a clinical facility.

The American Association of Physicists in Medicine (AAPM) Minority Undergraduate Summer Experience Program (MUSE) is designed to expose minority undergraduate university students to the field of medical physics by performing research or assisting with clinical service at a U.S. institutions (university, clinical facility, laboratory, etc).

H. ADMINISTRATION: Administrative oversight for the program should be sufficient to ensure quality.

H1. Indicate how the program will be administered and the degree to which this work will affect the administrative structure in which it is located.

Current administrative procedures will be used.

H2. Indicate the titles of the persons who will have administrative responsibility for the program and the percent of time each will spend on the program.

Department Chair: Jan Northby

H3. Indicate additional annual administrative salaries and related costs to be associated with the program. Distinguish between existing resources and new resources. (Include this information on the budget form, which can be found at *www.ribghe.org/publicreg.htm.*)

None

I. INSTRUCITONAL RESOURCES: The instructional resources should be sufficient in quantity, quality and timeliness to support a successful program.

I1. Estimate the number and cost of relevant print electronic and other non-print library materials needed (and those available) for the program and compare with recommendations of national accrediting agencies, the standards of the Association of College and Research Libraries, and/or any other recognized measures of general library adequacy in terms of collections, staff, space and operations.

None beyond existing resources

I2. Identify and evaluate other instructional resources and instructional support equipment (such as computers, laboratory equipment and supplies) in terms of overall capability to satisfy the needs of the program. If these instructional resources are considered insufficient or if upgrading is necessary for the development of the program, the additional needs should be detailed and their cost estimated.

RIH will be making available state-of-the–art medical facilities for students in this program. We are also applying for grants to augment our equipment and update some of our labs. While these upgrades are beneficial, they are not required for the success of the program.

I3. Estimate annual expenditures for instructional resources. Distinguish between existing resources and new resources. The information should reflect the annual operation and maintenance of the instructional resources, recurrent costs and costs for necessary additions. (Include this information on the budget form, which can be found at *www.ribghe.org/publicreg.htm.*)

None beyond existing resources or 3 per-course instructors/year = $12,600

I4. Provide assurance that the institution's chief academic officer has worked with appropriate library and other staff in the development of the assessments and estimates regarding instructional resources and they are in agreement on the adequacy of estimates.

J. FACILITIES AND CAPITAL EQUIPMENT: Facilities and capital equipment should be sufficient in quantity, quality and timeliness to support a successful program.

J1. Describe the facilities and capital equipment (e.g., classrooms, office space, laboratories, and telecommunications equipment) and assess the adequacy of these resources relative to the program and to the requirements of the American with Disabilities Act and state disability statues.

Uses existing resources.

J2. If new or renovated facilities are necessary, explain in detail (e.g., requirements, costs, sources of revenue, and expected date of completion). (Include this information on the budget form, which can be found at *www.ribghe.org/publicreg.htm.*) [Note: the RIBGHE's Facilities Committee is responsible for approving lease, purchase or other agreements and ensuring that the facility meets all building, fire and health codes and ADA requirements.]

None

J3. Estimate the annual additional expenditures for new program facilities and capital equipment. (Include this information on the budget form, which can be found at *www.ribghe.org/publicreg.htm.*)

None

J4. Indicate whether the needed facilities are included in the institution's master plan.

Not applicable

J5. Provide assurance that the institution's chief academic officer has worked with the facilities director (or equivalent) in the development of assessments and estimates regarding facilities and capital equipment and that they agree on the adequacy of estimates.

Not applicable

K. **FINANCIAL CONSIDERATIONS: Projected revenues should be sufficient to support a successful program and must cover the estimated costs of the program.**

K1. Expenditures for program initiation and annual operation should be estimated and displayed in the proposed budget. The summary should enable the reader to understand expenditures for a period representative of one full program cycle.

Estimate for 2 In-State and 2 Out-of State Students/year
Income When 5-year Program is Saturated:

- 10($7,454)+10($23,552) = $310,060/year
- Initial Grant from RIH = $25,200 (waiver of per-course salary for 2 years)

Expenses:

- 3 per-course instructors/year = $12,600

K2. Revenue estimates should be provided for a similar period of time. For a new program, the appropriateness and feasibility of instituting differential tuition and/or fees should be addressed.

NOTE: **Excel budge forms, which are self-calculating, may be downloaded from the RIOHE website at *www.ribghe.org/publicreg.htm*. Contact RIOHE's Academic and Student Affairs division for assistance in completing the forms.**

$297,460/year (310,060-12,600)

K3. Describe how current institutional resources will be redeployed or extra institutional resources will be obtained to support the program (e.g., describe program eliminations, staff reallocations and/or external sources of monies).

No redeployment of resources.

K4. Provide assurance that the institution's chief academic officer has worked with budget director and controller in the development of the financial projections and that they agree on the adequacy of the estimates.

L. **EVALUATION: Appropriate criteria for evaluating the success of a program should be development and used.**

L1. List the performance measures by which the institution plans to evaluate the program. Indicate the frequency of measurement and the personnel responsible for performance measurements. Describe provisions made for external evaluation, as appropriate.

Department faculty together with faculty from RI Hospital (the Steering Committee) will review the program annually. An in depth review will be held after the first class graduates. Annual and three year adjustments to the program will be made as appropriate.

L2. Describe and quantify the program's criteria for success.

The criteria for success are three-fold:

a) Compete successfully against programs from across the nation for the brightest students. The incoming high school records and SAT scores of our students will be a measure of our success. Currently, the SAT scores of incoming declared Physics Majors are second only to those of the 6-year Pharmacy Program. Our initial target is 5 incoming students / year.

b) Graduate and place students who become leaders in Medical Physics. Success will be measured by the percentage of incoming students who complete the program on time. Our target is 60%.

c) Expand the profile of the University through interaction throughout Rhode Island. The success of our effort will be measured by increased donations to our department and college. We already have a committed $10,000 donation for students in Medical Physics.

L3. If the proposed program is eligible for specialized accreditation, indicate name and address of the accrediting agency and a list of accreditation requirements. If specialized accreditation is available but not sought, indicate reasons.

Our goal is to start program and obtain accreditation. The Commission on the Accreditation of Medical Physicists Educational Programs (CAMPEP) is a nonprofit organization whose objectives are the review and accreditation of educational programs in medical physics. Now, accreditation is a voluntary, non-governmental process of peer review, the objective of which is to ensure a program or institution has met a defined standard. Accreditation serves as public recognition that a program provides a quality service or education.

L4. Describe the process that communicates the results of the program evaluation to appropriate institutional stakeholders and uses the outcomes for program improvement.

A committee of Physics Faculty and RIH Medical Physicists will serve as a Steering Committee to monitor the program with respect to the criteria above. Adjustments will be made to optimize the program. The results will be forwarded to the Dean of the College of Arts and Sciences.